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HON. J.W. SPOONER, MINISTER

F.A. MacDOUGALL, DEPUTY MINISTER

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THE COVER

This Timber Wolf is one of a litter which was raised from small pups during studies of this species in Algonquin Park. The members of the litter have had partial freedom for romps in the woods and, so far, have always returned to the Wildlife Station. Photo by D. H. Pimlott

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EDITORIAL

This magazine will be distributed four times a year to fish and game organizations and other agencies who are concerned with informing the public about the management programs which are designed to perpetuate the fish and wildlife resources of Ontario. The material contained in this magazine will be developed from technical reports of fish and wildlife management projects which are prepared by biologists and other field officers of the Department of Lands and Forests.

These reports have circulated within the Department for some years, now, and it is my belief that much of the information contained in them would be of interest to the general public.

The form followed will generally be that of the fish and wildlife management reports. These are not always completed scientific reports but, in many cases, they are progress reports of more extensive surveys which may continue over a number of years.

I hope you will find the material in this magazine to be interesting and informative.

The fish and wildlife resources of Ontario are an important asset, contributing as they do to the recreational needs of our own citizens and to the tourist industry. The best safeguard these resources can have is a well informed public. The purpose of the Ontario Fish and Wildlife Review is to inform the public of the scientific and technical measures which are being taken by my department to perpetuate these resources.

J.W. Spooner, Minister,

Department of Lands and Forests.

THE BEAR IS A GAME ANIMAL

by

C.H.D. Clarke

For years, since this land was settled, bears have been looked on as villains in our frontier communities. This has been based entirely on the damage bears do to property. Nobody has ever seriously maintained that our bears are dangerous. . Cases in our knowledge, where they have killed people, have been seen to have involved so-called tame bears, and in one case, a bear in a trap. The bear can be counted on to run away. Nevertheless, they are just formidable enough to invest the successful bear hunter with a little extra prestige.

The indiscriminate destruction of bears never, fortunately, went far enough to affect their numbers. Today we have bears in every part of Ontario where they could conceivably find a niche. After all, even though we have a bounty on bears, we never hunted them too assiduously because the injury they do us is only a matter of isolated raids on livestock, and damage to property, which, though more frequent, is usually more annoying than serious.

It is fortunate that our bears are still thriving because we can recognize them now as an unmistakable tourist asset. The glamour that surrounds them rubs off not only on the man who shoots a bear, but on any person who sees one. For the non-hunter, the bears have justified their interest, and are established as a prime tourist attraction. The interest of the hunter we can measure only by the success of the special non-resident licence for the spring bear hunt, the sale of which has trebled in ten years, so that bear hunters from the U.S. are bringing in revenue to our northland at a season when there isn't too much from other sources. Obviously, hunters from our own cities and settled areas must be included in the tourist group, but we have no record of them.

Obviously, it is time for our Game Laws to accord to the bear some measure of the dignity that our people at large have always accorded him. We propose that no longer shall resident hunters be authorized to kill bears simply by a cheap gun licence. We propose that that privilege shall go, during the hunting season for other big game, only to the holder of a big game licence, whether for moose or deer, as it does now for non-residents, and that in the spring season they, as well as the non-residents, shall have to get a special bear licence. The cost of this latter for non-residents should, we feel, go up a little.

Our bear bounty was started some fifteen years ago when, as sometimes happens, there was a season of great abundance of bears, and they wandered far into settlements. We have had three such periods since in spite of the bounty. It was an unhappy compromise from the first. Nobody wanted to bounty bears all over the wilderness areas of the province where they, speaking generally, harmed nobody. To restrict the bounty, it was necessary to define the fringes of settlement and open the bounty to those who lived there, for bears causing damage. In order to meet these requirements, the bounty application provides for a description of the damage. This is an open invitation to fiction, unavoidable, but not good. I question seriously whether many bears were ever killed for our bounty that would not have been killed anyway. A geniunely malicious and destructive bear would be better left to our officers.

Black Bear in Algonquin Park. Photo by R. Muckleston

The following is the bear kill and the amount of bounty paid for the past five years.:

PERIOD	ADULTS	CUBS	BOUNTY
For year ending Mar. 31, 1956	614	50	$ 6,210.00
For year ending Mar. 31, 1957	611	50	6,225.00
For year ending Mar. 31, 1958	1568	300	16,930.00
For year ending Mar. 31, 1959	1084	116	11,145.00
For year ending Mar. 31, 1960	697	139	7,590.00

Let us not forget that, under Section 35 of the Game and Fisheries Act, any person who suffers from the actions of bears is given authority to take the most drastic steps to protect himself. What we propose will not result in bears getting any more immediate protection than they have now. As I noted, our province is fully stocked with them now. Our bounty, however, does us no credit and we shall look a lot better without it, and in the long run everybody will benefit from giving the bear the status that he has clearly earned, that of a game animal in his own right, a tourist attraction, and an economic asset in spite of occasional misdeeds.

Would it not be good to be able to say, like John Muir, the Scotsman who became the great American prophet of wilderness conservation: "To the sane and free it will hardly seem necessary to cross the continent in search of wild beauty, however easy the way, for they find it in abundance wherever then chance to be " Will we be able to talk like this in fifty years time, as he could do fifty years ago? Charles S. Elton, "The Ecology of Invasions by animals and plants."

WOLVES AND THE WOLF RESEARCH PROGRAM IN ONTARIO

by Douglas H. Pimlott

No animal has stirred the imagination of North Americans as have the coyote and the timber wolf. The presence of these animals during the period when the continent was being colonized gave rise to a vast amount of folklore and fanciful tales which even today dominate the thinking of many people. The reaction to the eerie howling of a timber wolf pack has always been one of fear. Farmers hearing it, as they brought home the cows from the back pasture at dusk or dawn, have shivered and, in many instances, hurried home convinced that their lives were in danger. This fear, combined with the fact that the wolves sometimes killed his stock and lived to a large extent on wild animals which he coveted for his own use, has made man the deadly enemy of the wolf and of the coyote.

Man's fear and prejudice has been unreasoning. In most cases, he has believed that there is nothing good about wolves and so he has sought to exterminate these enemies. Even in these days of wildlife research and management, much has been taken for granted, and the tendency has been to kill first and to ask questions second. Fortunately for the members of the wolf family, more and more men are re-appraising this uncompromising position. The Ontario Wolf Research Program is one of the most intensive re-appraisals that has yet been undertaken. The study is a search for understanding, a search to determine just where and how wolves fit into the present-day scheme of things. A basic premise behind the study is that the wolf's role is not always villainous - in many cases and circumstances, the influence of these predators may be beneficial. We are seeking the background knowledge which will enable us to "manage" wolves, rather than simply to control them. Even at the present stage of our investigation, we are able to visualize circumstances where management may mean protection, and others where it may mean intensive control.

A second premise behind the program is that there is a place in Ontario for the large predators. While it may prove in some circumstances to be good wildlife management to control them, extermination is not considered a desirable fate for the wolves.

In Ontario, the term "wolf", when broadly used, refers to either timber wolves (Canis lupus) or to brush wolves (Canis latrans). Although I have used the term in its general sense in the title, elsewhere I am more specific. Brush wolves are more commonly known as "coyotes" elsewhere on the continent, and I have adopted this name for use in this article. This approach permits me to refer specifically to members of the timber wolf group simply as "wolves". The word "timber" is often not appropriate because wolves of the prairie or of the high arctic would rarely see a tree and would almost never be associated with timber.

The wolf occurs in northern areas around the world. In primitive North America, they occupied a very large part of the entire land area (Young and Goldman, 1944). They were absent only from desert areas and from parts of the southern and western extremities of the continent. They exhibited so much variation in size, in skull characteristics and in colour, that they have been broken down into 23 different subspecies. The wolves of Ontario were described as part of the eastern subspecies, Canis lupus lycaon, which was said to range from the northern tip of Florida, through the maritime provinces to James Bay, and as far west as the Mississippi River and Minnesota. In addition, the range of the large Hudson Bay wolf was shown as entering the northwestern tip of the province along Hudson Bay.

Timber wolf at age of three months. Photo by D.H. Pimlott.

A study now being conducted by R. O. Standfield of the Research Branch shows that the picture of wolf taxonomy in the province is not nearly as simple as suggested by Young and Goldman. For example, the wolves in the northern part of the province are quite different from the Algonquin Park wolf of the south. Within the next few years, the picture should be clarified as a result of Mr. Standfield's studies.

The wolf's range has been greatly restricted since the continent was colonized. In the United States, for example, Minnesota is the only state that now has a remnant wolf population large enough to be considered free from the danger of extirpation.

Wolves are no longer found in Ontario's heavily settled southern counties, however, over much of the province, they are probably more abundant now than they were before the coming of the white man.

The coyote is a North American mammal and does not have the world-wide distribution of the wolf. It is believed that, prior to the settlement of North America, it was primarily an animal of the open plains (Young and Jackson, 1951). As man cut the forest and began to farm, conditions became more and more favourable for the coyote and it gradually extended its range. At the present time, it is found over large areas of North America from the Atlantic to the Pacific, and from the Gulf of Mexico to Alaska.

The coyote is a relative newcomer to Ontario. At the turn of the century, coyotes occurred in only a small section of northwestern Ontario (Cross, 1937). It is believed that they entered the province by both western and southwestern Ontario. One of the first well-documented records of coyotes in Southern Ontario was of one taken by, or for, the National Museum in Lambton County in 1919. It appears that there was a tremendous upsurge of coyote numbers during the period when these animals were colonizing the western part of the province. The numbers on which bounty payments were made increased rapidly from 1,066 in 1925 to 4,878 in 1928 (Omand, 1950). The population declined as rapidly as it built up and in 1934 only 812 bounty payments were made for this species. During the past twenty years, the annual kill has only exceeded 1,000 animals in two years, and in two other years it dropped to less than half that number. In the eastern part of the province, they spread more slowly and were not reported from the Lower Ottawa Valley until the early 1950's.

The considerable variation among coyotes is evidenced by the division of the species into 19 different subspecies. Although the Ontario coyote is listed as Canis latrans thamnos, intensive studies by R.O. Standfield indicate that at least two subspecies are present.

The coming of the coyote has resulted in the addition of another animal to our fauna, the coyote-dog hybrid. These hybrids occur in most areas that are inhabited by coyotes, sometimes actually outnumbering coyotes. In parts of the eastern United States, the hybrids are aptly called "coydogs". R. Standfield's studies are providing much background information on these animals.

The spread of the coyotes into many new areas, during the period when the wolves were being exterminated in the same areas, is an indication of the compartive adaptability of the two species to civilization. The success of coyotes in living close to civilization is undoubtedly the result of the interaction of many factors. Two of the most important, probably, are their tendency to live a more solitary life and to feed on small mammals rather than on big game, as do the wolves.

Wolf and Coyote Investigations

Objectives, Programs and Study Areas

The first intensive research program began in 1951 when R. Standfield began his studies of the immigration, distribution, taxonomy and reproduction of coyotes and coyote-dog hybrids. These studies were mentioned briefly in the previous section. One of the interesting aspects of this work was the capture of wild hybrids and subsequent development of a captive population. The hybrids in this experimental colony at one time numbered over 40 animals.

The investigation program which is now underway commenced in 1957 and includes both the wolves and the coyotes in its scope. It will be completed in 1965. The principal objective of the study is to determine the influence that these animals exert on wildlife populations and on the livestock industry. Making such determinations is a very difficult problem. It requires a detailed knowledge of the living habits and food habits of these wary, intelligent mammals. It also requires understanding of the maximum numbers of wolves or coyotes which can live together under best conditions of food in areas of varying habitat conditions. A considerable amount of the research being conducted in this section of the program is of a basic ecological nature, designed as it is to obtain information on the interrelationships of wolves and coyotes to the animals on which they feed and to the areas in which they live.

The greater part of the research on wolves is being done in Algonquin Park where there is quite a high wolf population. Additional studies, particularly on food habits of wolves, are being conducted in a number of Forest Districts throughout Ontario. The investigations on coyotes will not begin on a full-scale basis until 1962. The work on these animals will be centred on Manitoulin Island and will extend over a two-year period.

The influence of wolves and coyotes on the livestock industry has been, or will be, studied in three areas of Ontario: the Little Clay Belt area, Manitoulin Island and the Rainy River district.

The secondary objective of the program is to investigate ways and means of controlling wolves and coyotes most efficiently. This work includes a detailed analysis of the bounty system; studies of methods of using poisons under conditions which vary from heavy forest to mixed agricultural land; studies of the degree of intensity of poisoning that is necessary to actually reduce the wolf population in an area; and studies to determine what influence the use of poison may have on fur-bearing mammals and on birds. Specific work is also being done on how to set poison baits in order to prevent birds, particularly ravens and eagles, from feeding on them.

The experimental work on the use of poisons is being conducted in various parts of the province. The main project on forested land is in an area between Lake Nipigon and Sioux Lookout. The one on agricultural land is in the Rainy River district. Small-scale projects are being conducted near Chapleau and Kenora. It is possible that the work on agricultural land may be extended to a section of Manitoulin Island during the last two years of the work in that area.

We believe that many of the losses of domestic stock that occur are caused by wolves or coyotes that have learned to prey on livestock. Because of this, an intensive study is being made to determine the best methods of locating and eliminating specific family groups. It is hoped that the results of this study will reduce the need for wide-scale control programs which result in the killing of many animals that are not causing problems. The work on this aspect of the program is being centered in the Renfrew area and on Manitoulin Island.

The scope of the research on aspects of wolf control has been widened by the co-operation of members of the staffs of a number of Forest Districts. The projects previously mentioned, at Port Arthur, Sioux Lookout, Fort Frances, Chapleau and Kenora, are being conducted by personnel of these districts. The initial planning and co-ordination are the only aspects of the work that is undertaken directly by members of the Wolf Programme. The staffs of these and of other districts are helping, or have helped, in a number of other aspects of the over-all programme. This co-operation extends throughout virtually all of the 22 Forest Districts. It is gratefully acknowledged.

Methods of Research

There are frequently many problems posed when wild animals are being intensively studied for the first time. The situation can perhaps be compared to the problems of keeping warm in winter which were encountered by the caveman and by modern-day trappers. Even when an adequate supply of wood was available to the caveman he had only primitive tools to cut it with. He had either to expend a very great amount of effort, go cold, or live in very restricted quarters to conserve heat. The modern trapper, on the other hand, has good tools in the form of saws, axes and files, and so expends relatively little of his total effort to build and heat his cabin.

The Ontario programme is one of the first intensive efforts to study wolves in areas which are heavily forested. Because of this, much time is being spent in developing methods of studying wolves, that is, acquiring the tools. The success of the field investigations is often entirely dependent on the degree of success that is attained in the development of working methods, or "techniques" as they are frequently called.

An example is perhaps the best way to illustrate how the development of a working method is influencing the success of the research program: during the summer of 1958, members of the Wolf Program attempted to locate the ranges and denning areas of wolves in some parts of Algonquin Park. The objective was to do food-habit studies and to capture, mark and release wolves to obtain information on their movements. The location of wolves proved to be very difficult. The forest cover is heavy, and the wary wolves were

A family of timber wolf pups. Photo by D.H. Pimlott.

rarely seen and seldom left much evidence of their comings and goings. The summer programme was relatively unsuccessful. During the following winter, the idea of using tape recordings of wolf howls to locate wolf packs was developed. A captive population of wolves, coyotes and hybrids is maintained at the Wildlife Research Station, in Algonquin Park. These animals have a great urge to howl and when one starts the others usually join in. The howling of the entire population can often be triggered by "human" wolf howling. It seemed logical that wild wolves might react in the same manner.

The first step, to obtain a series of tape recordings of the howls of the captive animals, was taken in March, 1959. During the following summer, these howls, much amplified, of course, were played in various parts of the park that could be reached by the road. Finally the right locations were found, and replies from two different family groups were obtained in the course of a few days The dens of both groups were located by taking bearings of the apparent centre of the most intensive howling and then plotting these on maps of the area. These wolves were used as test groups,and their responses to the tape-recorded howls were studied intensively during the remainder of the summer and fall. It was learned that the night was the best working time. Replies were obtained in a high percentage of the tests that were undertaken.

The next step was the application of the technique of the research programme. This was undertaken during the summer of 1960 when we made a census of the wolf groups in 12 townships in the heart of Algonquin Park. We were also able to obtain considerable information on the ranges, movements and home areas of a number of the groups. In areas outside the park, the recordings were used to locate groups for food-habit studies. Preliminary work also began in adapting the technique to the location of specific groups of wolves in agricultural areas, a study which was mentioned in a previous section.

Methods of estimating wolf numbers from aircraft observations is one of the most important and most difficult of the working methods which is being investigated. Extensive use was made of a helicopter, in this study, in 1958 and 1959. Currently, the study is being continued with the use of a Beaver aircraft in the Algonquin Park study area.

Results of Research

The research program is just beginning to reach the stage where the results of some of the studies are being presented. Each year, some aspect of the work will be presented in preliminary reports or as published papers. However, the greater part of the work will not be finalized until 1964, after which the final reports will be published. It is anticipated that, in the interim, the progress of the research programme will be periodically reviewed in this publication.

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"We abuse land because we regard it as a commodity that belongs to us. When we see land as a community to which we belong we may begin to use it with love and respect. There is no other way for land to survive the impact of mechanized man, nor for us to reap from it the esthetic harvest it is capable, under science, of contributing to culture.

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics. That land yields a cultural harvest is a fact long known, but latterly often forgotten.

"To sum up, wildlife once fed us and shaped our culture. It still yields us pleasure for leisure hours, but we try to reap that pleasure by modern machinery and thus destroy much of its value.

"Reaping it by modern mentality would yield, not only pleasure, but wisdom as well. Aldo Leopold.

PRELIMINARY DEER INVESTIGATIONS IN THE ESPANOLA FORESTRY WILDLIFE MANAGEMENT UNIT, SUDBURY DISTRICT

by

D.A. Mulligan and L.L. Trodd

Introduction:

When a species, whether plant or animal, approaches the limits of its natural range, sharp fluctuations in its numbers may be expected. Much of Sudbury's deer range is considered marginal, and the fluctuations follow almost as a corollary.

Early in 1959, Wm. Maslen, forester with Espanola Division of Sudbury District, began to draw up his forest management plans for the area. While cruising Victoria and Salter Townships, he noted that the regeneration of several species was seriously retarded or completely killed off by excessive deer browsing. With this problem in mind, he approached Fish and Wildlife Branch to assist him in drawing up a master forestry wildlife management plan.

Description of the Area:

The area covered in this report represents the accessible portion of some 42 square miles of winter deer range lying within Victoria and Salter Townships (Map 1). It shows a mixed hardwood-conifer cover with white birch, trembling aspen, sugar maple, red maple, balsam fir and white spruce predominating. Topographically, the area is broken up by long granite ridges which form numerous outcroppings, running in an east-west direction. Glacial granitic till makes up the soil, varying in texture from a sand to a sandy loam.

The mean snow depth for 1959-60 was 16.2 inches with a maximum of 26.8 inches during the week of February 29th, 1960. Throughout the period, February 8th to March 8th, there were more than 21 inches of snow on the ground, with an average depth for the period of 25.1 inches.

Information gathered from local residents indicates that the major logging in this area ended during the 1920-26 period. The early fire history of the area is scanty, but it appears that a major fire north of Massey laid bare a large portion of five or six townships in the 1915-16 period. The last recorded log drive occurred in the spring of 1924 on the Sauble River. Some cutting of hemlock in the Walford Area took place as late as 1939-40. Since that time, the cutting in this area has been confined to the removal of pulpwood.

Reports from the older local residents, including the former game warden, indicate that this area, north of Highway 17, supported a high deer population during the 20's, 30's and 40's, with a peak population about 1923-24. Some of the remaining early settlers maintain that there were no deer in the area at the turn of the century and it wasn't until the start of the First World War that they started to appear in the vicinity. They then multiplied rapidly until residents found it was possible to successfully hunt within a short distance of the town. In many cases, deer were shot within the town limits. It appears, then, that the decline started in the early 30's, proceeded gradually until 1945, then speeded up during the 1945-1955 interval. From 1955 to the present time, there has been a drastic reduction in the deer herd. This has been very apparent in the number of dead deer found during the past two winters.

Methods:

While silviculture plans were being drawn up, preliminary wildlife surveys were started this spring. It had been hoped that an aerial survey during the winter months, of

Remains of a deer that died from starvation in Sudbury District during the winter of 1959-60. Photo by D.A. Mulligan.

the winter range, might be carried out, but due to inclement weather and conflicting programmes, the aircraft was not available. We, therefore, relied on the maps prepared during our winter cruises to delineate the study area (Map 1).

A. Yard Utilization

An estimate of the degree to which the deer were utilizing the area during the winter months was obtained from a pellet group count during the period April 28 to May 17, 1960. We are hesitant to base our population estimate on this technique as no record was made of the arrival and departure of the wintering herd. (Very few deer remain beyond the wintering period in the area under study).

Transect lines traversing the topography in a direction N 20 degrees E were run from East to West across the study area. The number of pellet groups found in plots 66 feet by 6.6 feet located at five chain centre to centre intervals along these lines, were recorded. The following formula was used to give us our degree of utilization in deer days:

$$\frac{\text{Average No. of pellet groups per plot} \times 100 \times 640}{12.7} = \begin{array}{l}\text{Deer/Sq.}\\ \text{Days/Mi.}\end{array}$$

B. Dead Deer

A dead deer survey was carried out conincidental with the yard utilization and browse surveys. Two wing men paralleled at a distance of one chain the centre man who compassed the transect lines. All carcasses falling within the three chain strip were recorded as winter kills. Since it soon became evident that most of the carcasses were torn up by wolves and/or foxes and dogs, we had to decide what would constitute a carcass. Four legs or one leg and a skull were considered the minimum parts necessary to be recorded as a carcass. At each carcass; a search was made for additional bones and when carcasses were found on adjacent plots or lines a check was made to determine the exact number of animals found. Condition of the carcass, age, marrow conditions, location and forest type were recorded wherever possible.. Jaws of animals older than age class one were collected wherever possible. Dead deer per unit area (square miles) was calculated from the following formula:

$$\frac{\text{No. of dead deer found x } 43{,}560 \text{ x } 640}{198 \text{ x total length of survey lines}} = \text{dead deer per square mile}$$

C. Vegetation

As previously indicated, a browse survey was conducted simultaneously with the yard utilization and dead deer surveys. At each plot examined for pellet groups, a wing man would come in to assist the chain man in tallying while the other man did the recording. The method followed was a modification of the Passmore-Hepburn technique (1955). Total number of stems and number browsed per species per plot was recorded. Available browse was considered to be that portion of the trees and shrubs between 1.5 feet and 6.5 feet above the ground. Mutilation and mortality brought about by excessive browsing were also recorded. A description of the forest stand and site was made for each plot.

Survey Results and Discussion

The Victoria yard is an old, established wintering area for deer. The damage to regeneration, brought about by the herd, is outstanding and it is evident that corrective measures must be taken to assure the perpetuity of both the deer and the forest. Without these measures, we can expect a continued decline of the herd and further damage to regeneration. How to reduce the herd so that cutting practices will stimulate additional regeneration and browse production is our foremost problem. It was noted during the hunting season, November 1 to November 25, 1959, the number of deer harvested from this area was remarkably low when compared to the wintering population. Further observations have indicated that the deer move into the area late in December or in January. With this situation existing, it is almost impossible to appreciably reduce the herd size by havesting during the present season. We will concede that if the situation is allowed to continue as it is today the herd will be reduced to the level we desire, but those deer lost through predation, starvation, accident, etc. would be better utilized from the public's and our standpoint, if legally harvested.

A. Wintering Concentration

Nine hundred and five pellet groups were found on the 204 plots taken along the transect lines. This is an average of 4.4 pellet groups per plot. The calculated utilization of the area by the deer herd is 22,173 deer days.

$$\frac{4.4 \text{ x } 100 \text{ x } 640}{12.7} = 22{,}173.4 \text{ /square mile.}$$

4.4 - average number of pellet groups per plot;
100 – conversion factor to acres;
640 - number of acres per square mile;
12.7 - theoretical number of pellet groups deposited per deer per day.

B. Dead Deer

A total of 38 carcasses were located along 13 miles of transect lines. This figure inserted in formula (2) produced a calculated winter kill of 78 per square mile.

$$\frac{38 \times 43{,}560 \times 640}{198 \times 68{,}508} = 78.1/\text{ square mile}$$

38 - number of dead deer found;
43,560 - number of square feet per acre;
640 - number of acres per square mile;
198 - width of survey strip in feet;
68,508 - length of survey line in feet.

While this is a higher calculated winter mortality than was found in any of the districts surveyed in the spring of 1959, it is not surprising when the situation is analyzed.

1. The area produces a minimum of winter cover and browse.
2. The area supports a high concentration of deer during the critical winter period.
3. At least one pack of wolves traverses the area regularly during the critical period and, during the 1959-60 season, four dogs were shot in the area while running deer.

Combining the calculated winter mortality and winter area utilization figures, a clearer picture of the problem develops. If we assume the leafless period, i.e. the wintering period, to be 200 days, we calculate that our wintering concentration in the area surveyed to be 110 deer per square mile. Based on this figure and the calculated winter kill figure, we might then assume that our winter losses were 70% of the wintering herd. However, as noted before, the herd does not move into the Victoria yard before late December, and our observations indicated they had left by mid-April. This, then, gives us a wintering period of approximately 110 days and a concentration of 202 deer per square mile. With this figure we might then assume that our winter losses from the Victoria herd to be in the neighbourhood of 39%. This is perhaps a more realistic figure in view of the conditions present.

C. Browse Conditions

One hundred and fifty-four plots were examined for browse conditions. The results may be found in Table I. Species are listed in order of per cent relative density, showing the number of living stems of each species per acre and the degree of browsing each species received, recorded as per cent stems browsed. The number of dead stems per acre is also recorded in this table, as is per cent relative frequency of living stems. Mutilation was noted to be high, particularly in those species which showed heavy 1959-60 utilization.

The maples, red, mountain, striped and sugar, appear to be the most important browse species of this area from a utilization availability standpoint.

Thirty woody species were recorded present as available browse in the area. The four maples plus hazel made up 60% of this available browse. Balsam fir, while constituting only 5.4% of the available winter food, undoubtedly plays a more significant role in browse availability due to its growth form.

D. Timber Types and Their Utilization

The forest type was classified according to the following method!

Conifer	Over 75% conifer
Conifer-hardwood	50-75% conifer
Hardwood-conifer	25-50% conifer

Hardwood	0-25% conifer
Swamp	Bogs and swamps (excluding cedar)
Open	Rock outcroppings.

It was found using this method that the cover composition of the area was as follows:

Hardwood	39%
Conifer-hardwood	13%
Conifer	17%
Hardwood-conifer	15%
Open	12%
Swamp	4%

If the degree of utilization of each cover type is compared by calculating the percentage of pellet groups found under each type, we find:

Hardwood	29%
Conifer-hardwood	23%
Conifer	21%
Hardwood-conifer	18%
Open	8%
Swamp	1%

Heavy competition from mice and snowshoe hares was noted in many parts of the area under examination. Mouse damage was particularly prominent, with girdling of the maples and birches outstanding. Several snowshoe hares were seen during the study and, in many instances, hare browsing was recorded.

Summary and Conclusions

The Victoria yard was mapped by a ground crew during the winter of 1959-60. The portion of the yard examined during May 1960 is assumed to have supported a wintering density between 110 and 202 deer per square mile. The winter mortality of the area examined was calculated to be 78 per square mile, i.e. 70% or 39% of the wintering herd population depending upon which wintering density is used in the calculation. We feel the latter density and mortality rate are the most realistic.

An attempt must be made to reduce the herd before silviculture practices are applied to improve habitat conditions. A late hunting season is recommended.

The area has produced a good quantity of browse, 6765 stems per acre, but, due to the heavy concentration of deer, the browse potential is being exceeded by the intensive utilization. This production density figure of 6765 may be misleading if considered as a browse availability value. Severe browsing has retarded twig development and, if the same browsing pressure is applied to this regeneration in the future, it is expected that heavy sapling mortality will result.

The more shade tolerant species, particularly the maples, make up the bulk of the available winter food. This may be due to a combination of past forestry practices plus the exceedingly high deer concentrations. Situated in an area where pulpwood production is an important industry, the removal of conifers such as balsam fir and white spruce plays an important part in altering the forest composition.

With the high deer density present in the area, there appears to be very little hope of immediately improving the area surveyed for pulpwood production. We would, therefore, suggest that it be managed, in the future, as a combined wildlife-forestry unit, through silvicultural and wildlife techniques. The initial attempt will be to increase the regeneration and sucker production of certain preferred browse and cover species.

Acknowledgments

We are indebted to Don Hughson and Doug. Gillespie for their assistance in conducting the survey, and to Bill Maslen for the interest he has taken in the project. Credit must also be given to Charlie Bibby and Doug. Gillespie, for without their help and criticism, the report might never have been written.

Reference

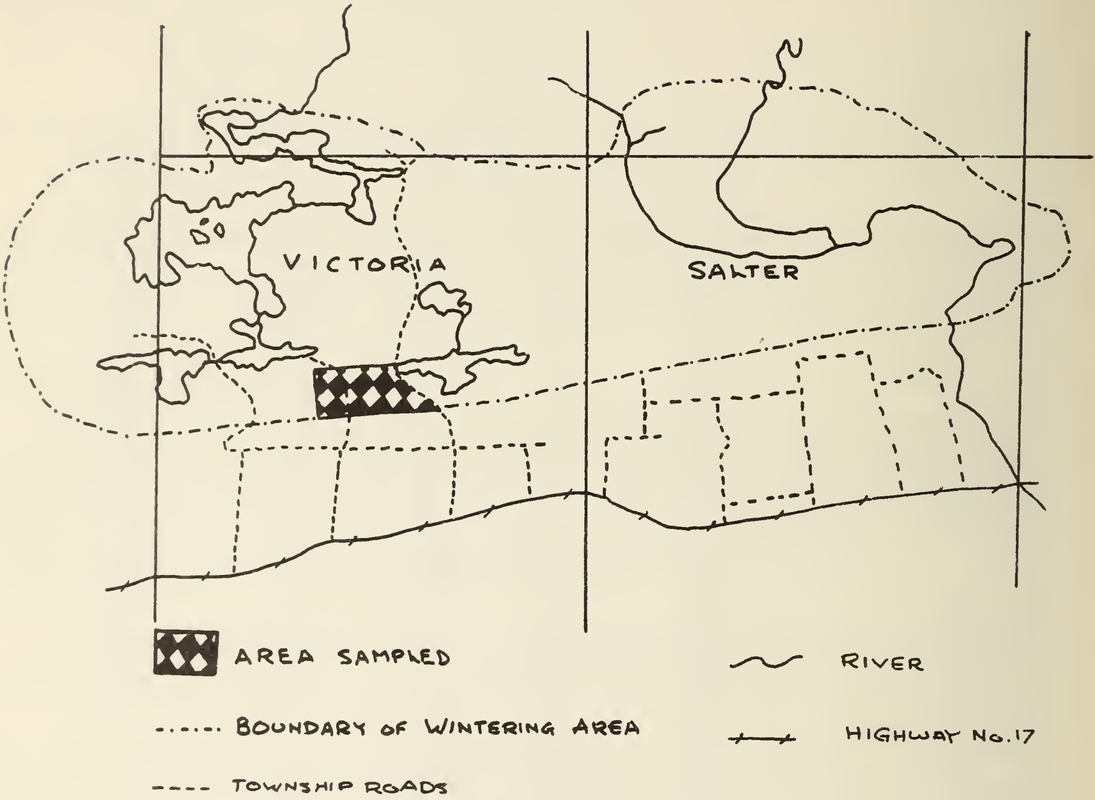
Passmore, R.C. and R.L. Hepburn, 1955.

A method for appraisal of winter range of deer. Ont. Dept. of Lands and Forests, Research Branch, Techn. Bull., 7 pp.

TABLE NO. I

Species	No. Living Stems/Acre	No. Dead Stems/Acre	Percent Utilization	Percent Relative Density	Percent Relative Frequency
Red Maple	1115	13	80	16.5	14.7
Hazel	960	23	35	14.2	9.1
Mountain Maple	917	53	82	13.6	7.9
Sugar Maple	798	47	47	11.8	9.7
Striped Maple	489	13	94	7.2	5.3
Raspberry	345	0	6	5.1	3.4
Speckled Alder	300	0	12	4.4	2.5
Trembling Aspen	277	15	52	4.1	5.1
Balsam Fir	232	21	30	3.4	7.4
Willow	204	9	40	3.0	5.1
Sumac	183	28	100	2.7	2.3
Black Ash	183	2	20	2.7	2.8
White Birch	166	21	33	2.5	5.0
Honeysuckle Sp.	162	0	9	2.4	3.8
Unidentified Sp. A.	109	0	26	1.6	1.1
Large Tooth Asp.	74	19	74	1.1	3.4
Blackberry	49	4	65	-1.0	1.1
White Pine	45	2	0	-1.0	3.0
White Spruce	43	4	20	-1.0	2.8
Balsam Poplar	34	4	56	-1.0	1.3
Red Oak	26	0	12	-1.0	-1.0
Black Cherry	21	0	0	-1.0	-1.0
Hornbeam	11	0	0	-1.0	-1.0
Red Elderberry	6	2	100	1.0	-1.0
Pin Cherry	6	4	67	-1.0	-1.0
Elm	2	0	0	-1.0	-1.0
Yellow Birch	2	0	100	-1.0	-1.0
White Cedar	2	0	100	-1.0	-1.0
Red Pine	2	0	0	-1.0	-1.0
Hemlock	2	0	0	-1.0	-1.0

MAP No. 1.


VICTORIA
SALTER
AREA SAMPLED
RIVER
BOUNDARY OF WINTERING AREA
HIGHWAY No. 17
TOWNSHIP ROADS

THE AGE AND GROWTH RATES OF ONTARIO GAME FISHES FOR FISH AND WILDLIFE MANAGEMENT

BY

O. E. DEVITT

Since the appearance of an earlier paper on "Rate of Growth of Game Fish" by Harkness(1) (1945), much additional information on the growth rates of Ontario fishes has been obtained. In order to make available these new records, the earlier list has been revised and new information added.

In an area as large as Ontario, considerable variation in growth is to be expected since fish grow more rapidly in some lakes than in others. Also, individuals of the same species may show wide diversity of growth even in the same lake; however, despite these differences, the majority of fish exhibit quite similar growth.

Why are there different rates of growth in different lakes? Multiple factors seem to be involved. For example, environmental conditions may be more suitable for the growth of a particular species in some lakes than in others. The extent of competition with existing fish populations can have an effect also. Furthermore, most fish grow faster in southern Ontario than they do in the northern parts of the Province since northern fish must attain all their season's growth in a much shorter period of time.

In the tables that follow, the average lengths and weights for the various age groups were calculated from Department of Lands and Forests records determined from a study of the scales of thousands of fish taken in lakes and streams across the Province. The number of such localities is indicated in the first column on the left. All lengths given have been converted to total length, or the distance from the tip of the snout with the jaw closed to the tip of the compressed lobes of the tail. Age groups represent the number of completed annuli.

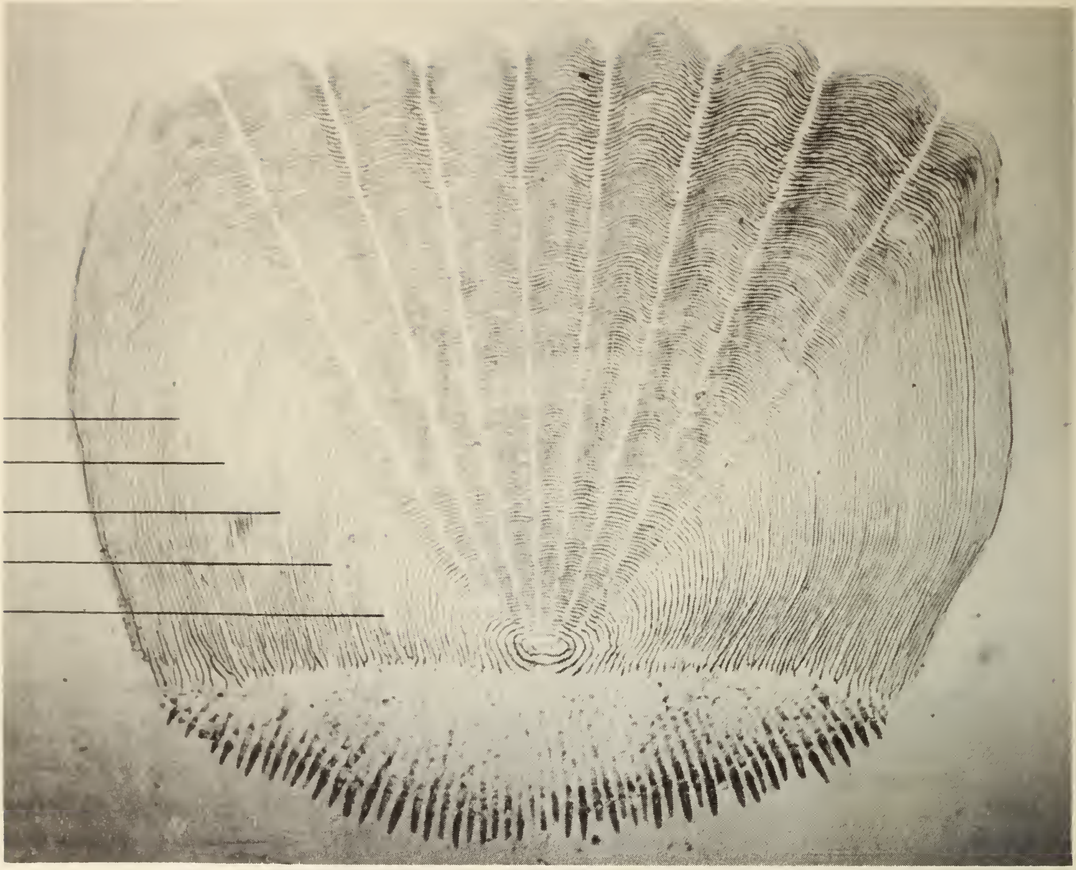
The tables are not intended as a final assessment of growth rates but, with due consideration to the factors mentioned above, can be expected to give a reasonably accurate estimate of the age, length and weight of the game fishes of Ontario.

(1) Harkness, William J. K., 1945. Rate of Growth of Game Fish for Fish and Wildlife Management, University of Toronto. Dept. of Zoology, Toronto, Ontario. PP. 1-6 (mimeographed).

TABLE 1

AGE AND SIZE OF LANDLOCKED SALMON OR OUANANICHE (Salmo salar) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight In Ounces No.	Average	Range
1	III	8	21.2	(20.0-22.0)	1	64.0	-
2	IV	7	23.0	(21.0-26.7)	3	55.0	(48.0-64.0)
2	V	4	29.3	(26.5-34.3)	1	184.0	-

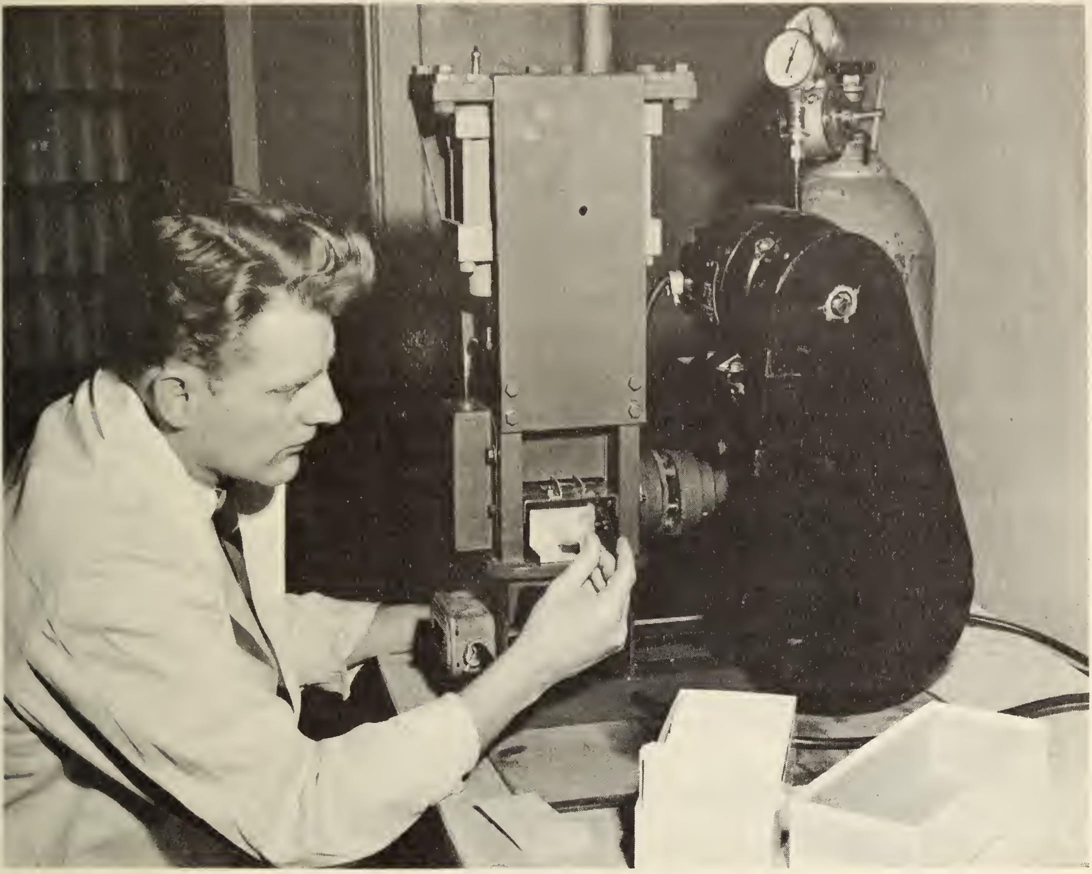


Scale impression of blue pickerel taken in Lake Erie in 1957, showing five year marks plus the current season's growth. Photo by T. Jenkins.

TABLE II

AGE AND SIZE OF BROWN TROUT (Salmo trutta) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight In Ounces No.	Weight In Ounces Average	Weight In Ounces Range
1	I	8	8.2	(7.0-8.0)	-	-	-
1	II	19	9.8	(9.1-12.1)	-	-	-
3	III	10	12.2	(10.8-16.2)	-	-	-
2	IV	2	14.4	(12.0-16.7)	1	24.0	-
2	V	2	15.9	(15.3-16.5)	1	36.0	-
4	VI	5	19.2	(18.0-20.0)	2	34.5	(32.0-37.0)
4	VII	5	21.3	(18.0-24.8)	1	64.0	-
3	VIII	5	26.5	(23.2-28.0)	4	91.0	(60.0-104.0)



Fish scale impression machine, in operation at Southern Research Station, Maple, Ontario. Photo by T. Jenkins.

TABLE III

AGE AND SIZE OF RAINBOW TROUT (Salmo gairdneri) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight in Ounces		
					No.	Average	Range
1	1	1	4.0	-	-	-	-
4	11	8	7.6	(5.0-8.9)	2	3.2	(2.8-3.7)
7	111	15	11.8	(8.0-16.5)	2	24.0	(15.0-34.0)
8	1V	39	16.1	(13.6-23.4)	8	31.5	(13.5-62.0)
6	V	16	19.8	(15.2-25.2)	6	53.2	(16.2-96.0)
3	V1	7	22.8	(21.7-27.2)	4	74.5	(64.0-99.0)
4	V11	6	26.2	(19.0-31.0)	5	151.9	(55.5-296.0)
1	V111	1	31.0	-	1	130.0	-

Removing fish from Seine Net, during experimental fisheries operations at Lake Opeongo, Algonquin Park, June, 1955. Photo by R. Muckleston.

TABLE IV

AGE AND SIZE OF KAMLOOPS TROUT
(*Salmo gairdneri kamloops*) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight in Ounces		
					No.	Average	Range
4	11	22	10.6	(7.0-14.5)	8	11.4	(3.3-24.0)
3	111	6	13.8	(11.5-17.0)	3	14.9	(12.8-16.0)
2	1V	3	16.0	(14.0-18.0)	2	24.0	-
1	V	3	24.0	(22.6-26.5)	3	87.3	(68.0-122.0)
1	V1	1	23.7	-	-	-	-

TABLE V

AGE AND SIZE OF BROOK TROUT
(*Salvelinus fontinalis*) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight in Ounces		
					No.	Average	Range
4	1	53	5.1	(3.1-6.7)	45	0.88	(0.25-1.83)
58	11	290	6.7	(4.5-15.1)	159	3.9	(1.2-16.2)
101	111	449	11.4	(7.2-18.0)	229	12.5	(2.5-42.0)
109	1V	301	14.8	(9.8-20.2)	172	27.9	(5.0-90.0)
73	V	176	17.6	(12.3-20.5)	112	43.0	(16.0-128.0)
24	V1	64	20.5	(15.9-23.5)	36	66.1	(24.0-144.0)
2	V11	3	23.0	(22.9-23.2)	2	81.0	(72.0-90.0)

TABLE VI

AGE AND SIZE OF LAKE TROUT
(*Salvelinus namaycush*) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight in Ounces		
					No.	Average	Range
1	1	1	4.4	-	1	0.40	-
1	11	15	7.6	(6.8-8.7)	11	3.07	(1.60-6.00)
					Weight in Pounds		
					No.	Average	Range
9	111	26	9.8	(8.2-12.5)	6	0.64	(0.50-1.00)
37	1V	118	11.9	(8.2-17.1)	35	0.73	(0.25-1.18)
60	V	257	14.3	(9.7-23.0)	77	1.69	(0.50-4.50)
68	V1	287	17.4	(13.2-25.0)	112	2.35	(0.93-6.50)
78	V11	308	19.6	(15.0-28.5)	149	3.09	(1.00-7.00)
58	V111	321	22.0	(16.5-31.0)	160	4.21	(1.70-10.00)
42	1X	219	24.4	(20.0-31.6)	102	5.81	(2.20-13.00)
37	X	132	26.5	(22.0-32.1)	53	6.84	(3.50-13.00)
23	X1	63	28.6	(23.0-36.0)	32	10.20	(5.00-18.00)
26	X11	49	32.1	(25.8-38.7)	42	12.83	(5.00-24.50)
6	X111	7	33.9	(30.5-39.7)	7	15.46	(7.70-22.50)
5	X1V	6	35.4	(32.0-40.7)	4	20.58	(12.50-27.12)
1	XV	1	35.0	-	-	-	-
2	XV1	2	40.6	(38.7-42.5)	2	32.00	(26.00-38.00)

TABLE VII AGE AND SIZE OF SPLAKE OR WENDIGO
(Salvelinus fontinalis x Salvelinus namaycush) IN ONTARIO*

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight in Ounces		
					No.	Average	Range
1	1	3	3.9	(3.6-4.3)	3	0.2	(0.1-0.3)
8	11	198	12.7	(9.5-15.9)	46	11.0	(5.0-28.0)
7	111	265	17.2	(14.8-20.6)	21	34.0	(28.0-52.0)
6	1V	23	20.1	(18.0-22.0)	9	52.0	(43.0-61.0)
3	V	6	24.8	(23.1-27.5)	6	92.0	(70.0-96.0)

* Including Scale Readings From Martin, N.V. and N.S. Baldwin. Observations on the Life History of the Hybrid Between Eastern Brook Trout and Lake Trout in Algonquin Park, Ont. J. Fish. Res. Bd. Canada, 17(4): 541-551, 1960.

TABLE VIII

AGE AND SIZE OF NORTHERN PIKE
(Esox lucius) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight in Ounces		
					No.	Average	Range
3	I	7	9.2	(6.8-12.3)	3	0.31	(0.12-0.50)
20	II	49	14.2	(11.5-19.5)	19	0.85	(0.43-1.50)
41	III	158	17.3	(12.0-22.9)	84	1.09	(0.50-2.43)
61	IV	253	20.8	(13.1-25.3)	158	1.87	(0.56-4.50)
58	V	265	23.1	(15.2-30.5)	149	2.53	(0.75-5.75)
59	VI	170	25.9	(18.3-33.6)	115	3.76	(1.00-9.00)
33	VII	108	28.7	(21.0-36.7)	75	5.15	(2.00-11.00)
20	VIII	40	31.6	(25.7-39.0)	22	6.25	(2.75-11.50)
18	IX	35	34.0	(28.8-37.1)	29	8.79	(4.37-12.75)
6	X	11	35.2	(30.5-39.0)	9	9.56	(5.50-16.30)
9	XI	13	35.8	(32.5-38.8)	8	10.50	(8.19-12.00)
5	XII	7	38.2	(35.0-45.0)	4	13.87	(11.50-19.00)
4	XIII	4	42.1	(38.0-49.5)	4	18.67	(15.00-24.00)
1	XIV	1	43.0	-	1	19.0	-

TABLE IX

AGE AND SIZE OF MASKINONGE (Esox masquinongy) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight In Pounds No.	Average	Range
1	I	2	14.0	(12.9-15.1)	-	-	-
6	II	7	17.1	(13.0-20.0)	-	-	-
7	III	33	22 1	(17.0-27.0)	6	2.50	(1.50-3.50)
8	IV	135	25 3	(20.0-30.7)	16	3.76	(2.80-5.00)
9	V	124	28.1	(22.6-33.4)	6	6.07	(4.70-8.00)
8	VI	99	31.2	(24.5-35.1)	12	8.56	(4.50-10.00)
8	VII	49	32.7	(27.9-38.0)	15	10.12	(6.00-14.50)
12	VIII	37	36.8	(28.5-48.6)	9	12.89	(8.25-17.00)
7	IX	28	39.7	(30.1-46.4)	9	18.86	(12.00-26.00)
8	X	30	42.5	(30.5-48.0)	14	22.60	(16.00-36.00)
5	XI	12	43.5	(32.0-48.6)	5	21.55	(17.00-25.20)
2	XII	3	47.9	(44.0-48.0)	3	25.20	(20.0-30.50)
5	XIII	9	49.4	(44.5-52.0)	8	34.10	(23.70-40.00)
2	XIV	4	49.1	(39.5-59.4)	2	32.50	(25.00-40.00)
2	XV	2	50.2	(47.5-53.0)	-	-	-
2	XVI	2	50.5	(50.0-51.0)	2	35.00	(30.00-40.00)

TABLE X

AGE AND SIZE OF YELLOW WALLEYE OR PICKEREL (Stizostedion vitreum) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight In Ounces No.	Average	Range
6	I	13	7.7	(7.2-8.1)	13	2.2	(1.5-5.0)
25	II	72	10.4	(7.6-13.8)	40	4.8	(2.0-19.0)
46	III	184	12.2	(8.7-15.2)	80	9.9	(4.0-24.0)
67	IV	344	14.2	(9.5-19.2)	146	13.2	(5.0-32.0)
89	V	477	15.7	(10.5-21.7)	250	19.3	(6.8-48.0)
96	VI	605	16.6	(11.8-22.5)	368	26.2	(8.0-57.0)
93	VII	880	18.1	(13.0-25.4)	410	34.1	(13.0-74.5)
70	VIII	906	19.1	(13.4-28.0)	517	42.5	(12.0-106.5)
55	IX	566	20.2	(14.0-28.6)	398	60.5	(14.0-192.0)
51	X	238	21.3	(15.5-28.6)	153	59.5	(16.0-140.0)
26	XI	99	23.6	(16.7-29.9)	67	69.4	(23.0-122.0)
24	XII	65	24.2	(16.0-31.2)	53	91.3	(23.0-160.0)
16	XIII	29	26.1	(22.7-31.2	26	116.6	(58.0-208.0)
12	XIV	17	26.5	(23.5-30.0)	16	109.3	(56.0-184.0)
8	XV	9	29.1	(25.7-33.7)	9	124.5	(83.0-164.0)
4	XVI	6	29.5	(26.5-31.5)	4	127.0	(93.0-168.0)

TABLE XI

AGE AND SIZE OF SMALLMOUTH BASS (*Micropterus dolomieui*) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight In Ounces		
					No.	Average	Range
6	I	45	5.9	(3.3-7.7)	2	2.1	(1.2-3.0)
20	II	246	7.9	(5.3-11.7)	42	5.9	(1.7-15.0)
41	III	706	10.3	(6.0-13.8)	191	11.4	(2.0-24.0)
58	IV	382	11.8	(7.5-16.0)	90	17.8	(7.0-36.0)
57	V	324	13.0	(8.7-17.0)	138	22.8	(6.0-48.0)
51	VI	306	14.2	(9.2-19.1)	171	27.5	(6.0-60.0)
30	VII	169	15.2	(10.5-19.6)	98	37.6	(10.0-64.0)
22	VIII	60	16.7	(13.2-20.5)	38	43.3	(12.0-68.0)
17	IX	37	17.2	(15.2-19.9)	23	53.4	(31.0-71.0)
10	X	12	18.2	(17.2-19.4)	4	63.2	(40.0-80.0)
4	XI	7	18.4	(17.9-19.5)	2	63.0	(60.0-66.0)
1	XII	2	19.5	(19.1-19.9)	2	58.0	(56.0-60.0)

TABLE XII

AGE AND SIZE OF LARGEMOUTH BASS (*Micropterus salmoides*) IN ONTARIO

Localities Represented	Age Group	No. Examined	Average Total Length In Inches	Length Range	Weight In Ounces		
					No.	Average	Range
4	I	10	6.7	(5.5-8.0)	3	2.3	(0.2-4.0)
15	II	66	8.7	(6.5-12.7)	4	8.5	(2.3-16.0)
26	III	137	11.3	(7.5-15.0)	23	16.8	(8.0-32.0)
25	IV	108	12.6	(8.7-16.0)	40	17.6	(8.0-40.0)
22	V	85	13.7	(9.5-17.0)	38	24.5	(8.0-40.0)
20	VI	54	15.4	(10.5-18.5)	26	40.7	(22.0-56.0)
17	VII	29	16.8	(15.2-19.9)	11	51.5	(16.0-80.0)
10	VIII	18	17.7	(17.0-19.4)	14	51.8	(32.0-64.0)
10	IX	13	18.0	(15.0-21.0)	9	63.4	(48.0-72.0)
5	X	7	19.3	(19.0-20.0)	2	64.0	-
2	XI	2	18.2	(18.0-18.5)	2	60.0	(56.0-64.0)
2	XII	3	19.8	(18.0-21.0)	1	100.0	(96.0-104.0)
1	XIII	1	21.0	-	1	88.0	-

Measuring smallmouth black bass during bass and pickerel survey on Lake Baptiste in Tweed District. Photo by R. Muckleston.

Swamp-Rondeau Park. Photo by R. Muckleston.